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APPLICATION NO.	FILING DATE	FIRST NAMED INVENTOR	ATTORNEY DOCKET NO.	CONFIRMATION NO.
10/606,193	06/25/2003	Norman Dale Brinkman	GMC 0039 PA/40320.42	4363

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EXAMINER	
TRAN, BINH Q	

ART UNIT	PAPER NUMBER
3748	

MAIL DATE	DELIVERY MODE
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Please find below and/or attached an Office communication concerning this application or proceeding.

The time period for reply, if any, is set in the attached communication.

Office Action Summary	Application No.	Applicant(s)	
	10/606,193	BRINKMAN ET AL.	
	Examiner	Art Unit	
	BINH Q. TRAN	3748	

-- The MAILING DATE of this communication appears on the cover sheet with the correspondence address --

Period for Reply

A SHORTENED STATUTORY PERIOD FOR REPLY IS SET TO EXPIRE 3 MONTH(S) OR THIRTY (30) DAYS, WHICHEVER IS LONGER, FROM THE MAILING DATE OF THIS COMMUNICATION.

- Extensions of time may be available under the provisions of 37 CFR 1.136(a). In no event, however, may a reply be timely filed after SIX (6) MONTHS from the mailing date of this communication.
- If NO period for reply is specified above, the maximum statutory period will apply and will expire SIX (6) MONTHS from the mailing date of this communication.
- Failure to reply within the set or extended period for reply will, by statute, cause the application to become ABANDONED (35 U.S.C. § 133). Any reply received by the Office later than three months after the mailing date of this communication, even if timely filed, may reduce any earned patent term adjustment. See 37 CFR 1.704(b).

Status

1)☒ Responsive to communication(s) filed on *09 March 2007*.

2a)☒ This action is **FINAL**. 2b)☐ This action is non-final.

3)☐ Since this application is in condition for allowance except for formal matters, prosecution as to the merits is closed in accordance with the practice under *Ex parte Quayle*, 1935 C.D. 11, 453 O.G. 213.

Disposition of Claims

4)☒ Claim(s) *1-14,16-38,48 and 49* is/are pending in the application.

4a) Of the above claim(s) _____ is/are withdrawn from consideration.

5)☐ Claim(s) _____ is/are allowed.

6)☒ Claim(s) *1-14, 16-38, 48-49* is/are rejected.

7)☐ Claim(s) _____ is/are objected to.

8)☐ Claim(s) _____ are subject to restriction and/or election requirement.

Application Papers

9)☐ The specification is objected to by the Examiner.

10)☐ The drawing(s) filed on _____ is/are: a)☐ accepted or b)☐ objected to by the Examiner.

Applicant may not request that any objection to the drawing(s) be held in abeyance. See 37 CFR 1.85(a).

Replacement drawing sheet(s) including the correction is required if the drawing(s) is objected to. See 37 CFR 1.121(d).

11)☐ The oath or declaration is objected to by the Examiner. Note the attached Office Action or form PTO-152.

Priority under 35 U.S.C. § 119

12)☐ Acknowledgment is made of a claim for foreign priority under 35 U.S.C. § 119(a)-(d) or (f).

a)☐ All b)☐ Some * c)☐ None of:

1.☐ Certified copies of the priority documents have been received.

2.☐ Certified copies of the priority documents have been received in Application No. _____.

3.☐ Copies of the certified copies of the priority documents have been received in this National Stage application from the International Bureau (PCT Rule 17.2(a)).

* See the attached detailed Office action for a list of the certified copies not received.

Attachment(s)

1) ☒ Notice of References Cited (PTO-892)
2) ☐ Notice of Draftsperson's Patent Drawing Review (PTO-948)
3) ☐ Information Disclosure Statement(s) (PTO/SB/08) Paper No(s)/Mail Date _____.
4) ☐ Interview Summary (PTO-413) Paper No(s)/Mail Date. _____.
5) ☐ Notice of Informal Patent Application
6) ☐ Other: _____.

DETAILED ACTION

This office action is in response to the amendment filed March 09, 2007.

Claim Rejections - 35 USC § 103

1. The following is a quotation of 35 U.S.C. 103(a) which forms the basis for all obviousness rejections set forth in this Office action:

> (a) A patent may not be obtained though the invention is not identically disclosed or described as set forth in section 102 of this title, if the differences between the subject matter sought to be patented and the prior art are such that the subject matter as a whole would have been obvious at the time the invention was made to a person having ordinary skill in the art to which said subject matter pertains. Patentability shall not be negatived by the manner in which the invention was made.

Claims 1-14, 16-38, and 48 are rejected under 35 U.S.C. 103(a) as being unpatentable over Murphy et al. (Murphy) (Patent Number 6,122,909) in view of Andrew et al. (Andrew) (Patent Number 6,464,854).

Regarding claims 1 and 48, Murphy discloses a device comprising an engine (15) and a NOx removal system (e.g. 30, 31, 189) for removing nitrogen oxides from an exhaust generated by said engine, said NOx removal system comprising a NOx treatment section (e.g. 30, 31, 189), a diverter (e.g. 48, 51), and a hydrogen generation section (e.g. 50), wherein: said exhaust comprises oxygen and nitrogen oxides; said NOx treatment section is configured to remove nitrogen oxides from said exhaust (Fig. 1-5); said diverter (e.g. 48, 51) is configured to enable delivery of water to said hydrogen generation section; said hydrogen generation section is configured to deliver hydrogen to said NOx treatment section (e.g. See col. 11, lines 15-54); and said NOx removal system is configured such that said delivery of said hydrogen to said NOx treatment section is substantially isolated from delivery of a substantial amount of said oxygen in

said exhaust to said NOx treatment section (e.g. See col. 10, lines 12-67; col. 11, lines 1-15; col. 13, lines 22-42). However, Murphy fails to disclose that the diverter is configured to extract water from the combustion exhaust.

Andrew teaches that it is conventional in the art, to use a diverter, which is configured to extract water from the combustion exhaust (See Abstract; Figs. 3-4, 8, and 12-13; col. 10, lines 27-67; col. 11, lines 1-5) so as to supply water into the hydrogen generation section.

It would have been obvious to one having ordinary skill in the art at the time the invention was made, to use a diverter, which is configured to extract water from the combustion exhaust of Murphy, as taught by Andrew for the purpose of supplying water into the hydrogen generation section, so as to reduce the poisoned materials in the purifying catalyst and to reduce amount of nitrogen oxides in the exhaust gas of the lean-burn engine, and further improve the performance of the engine and the efficiency of the emission device.

Regarding claim 2, Murphy further discloses that the exhaust gas comprises oxygen (e.g. See col. 11, lines 15-67; col. 12, lines 1-56).

Regarding claim 3, Murphy further discloses that the NOx removal system is configured such that said delivery of said hydrogen to said NOx treatment section is substantially isolated from delivery of said exhaust to said NOx treatment section (e.g. See col. 10, lines 12-67; col. 11, lines 1-15; col. 13, lines 22-42).

Regarding claim 4, Murphy further discloses that the NOx treatment section is configured to remove nitrogen oxides from said exhaust through adsorption (e.g. See col. 10, lines 12-67; col. 11, lines 1-15; col. 13, lines 22-42).

Regarding claim 5, Murphy further discloses that the NOx treatment section comprises a plurality of catalyst beds (e.g. See col. 10, lines 12-67; col. 11, lines 1-15; col. 13, lines 22-42).

Regarding claim 6, Murphy further discloses that the NOx treatment section comprises at least one NOx adsorber (e.g. See col. 10, lines 12-67; col. 11, lines 1-15; col. 13, lines 22-42).

Regarding claim 7, Murphy further discloses that the NOx treatment section defines at least two independent NOx treatment zones (e.g. See col. 10, lines 12-67; col. 11, lines 1-15; col. 13, lines 22-42).

Regarding claim 8, Murphy further discloses that the independent NOx treatment zones are defined by independent NOx adsorbers (e.g. See col. 10, lines 12-67; col. 11, lines 1-15; col. 13, lines 22-42).

Regarding claim 9, Murphy further discloses that the independent NOx treatment zones are defined by multiple catalyst beds packaged as a single NOx adsorber unit (e.g. See col. 10, lines 12-67; col. 11, lines 1-15; col. 13, lines 22-42).

Regarding claim 10, Murphy further discloses that the NOx removal system is configured to deliver said exhaust to one of said independent NOx treatment zones on a selective basis (e.g. See col. 10, lines 12-67; col. 11, lines 1-15; col. 13, lines 22-42).

Regarding claim 11, Murphy further discloses that the delivery of said exhaust is affected by a flow diverter valve (e.g. See col. 10, lines 12-67; col. 11, lines 1-15; col. 13, lines 22-42).

Regarding claim 12, Murphy further discloses that the NOx removal system is configured to deliver said hydrogen from said hydrogen generation section to one of said independent NOx treatment zones on a selective basis (e.g. See col. 10, lines 12-67; col. 11, lines 1-15; col. 13, lines 22-42).

Regarding claim 13, Murphy further discloses that the NOx removal system is configured to deliver said hydrogen and said exhaust to said NOx treatment section such that each is delivered to different ones of said independent NOx treatment zones on a selective basis (e.g. See col. 10, lines 12-67; col. 11, lines 1-15; col. 13, lines 22-42).

Regarding claim 14, Murphy further discloses that the diverter is positioned downstream of said NOx treatment section (e.g. See col. 10, lines 12-67; col. 11, lines 1-15; col. 13, lines 22-42).

Regarding claim 16, Murphy further discloses that the diverter comprises a condensation unit or a semi-permeable membrane (e.g. See col. 11, lines 15-67; col. 12, lines 1-56).

Regarding claim 17, Murphy further discloses that the hydrogen generation section is configured to deliver an amount of hydrogen sufficient to affect desulfation of said NOx treatment section (e.g. See col. 11, lines 15-67; col. 12, lines 1-56).

Regarding claim 18, Murphy further discloses that the hydrogen generation section is configured to deliver an amount of hydrogen sufficient to affect catalytic regeneration of said NOx treatment section (e.g. See col. 10, lines 12-67; col. 11, lines 1-15; col. 13, lines 22-42).

Regarding claim 19, Murphy further discloses that the hydrogen generation section is configured to accumulate and store hydrogen (e.g. See col. 11, lines 15-67; col. 12, lines 1-56).

Regarding claim 20, Murphy further discloses that the hydrogen generation section further comprises a pressure monitor configured to monitor said accumulation and storage of hydrogen (e.g. See col. 11, lines 15-67; col. 12, lines 1-56).

Regarding claim 21, Murphy further discloses that the hydrogen generation section comprises an electrolysis unit (e.g. See col. 11, lines 15-67; col. 12, lines 1-56).

Regarding claim 22, Murphy further discloses that the hydrogen generation section comprises a hydrogen storage reservoir fed by a hydrogen output of said electrolysis unit (e.g. See col. 11, lines 15-67; col. 12, lines 1-56).

Regarding claim 23, Murphy further discloses that the hydrogen generation section is configured to deliver hydrogen to one of at least two independent NOx treatment zones of said NOx treatment section on a selective basis (e.g. See col. 11, lines 15-67; col. 12, lines 1-56).

Regarding claim 24, Murphy further discloses that the hydrogen generation section comprises at least one hydrogen injector (e.g. See col. 11, lines 15-67; col. 12, lines 1-56).

Regarding claim 25, Murphy further discloses that the hydrogen generation section comprises a pair of hydrogen injectors; and each of said hydrogen injectors is in communication with different independent NOx treatment zones of said NOx treatment section (e.g. See col. 11, lines 15-67; col. 12, lines 1-56).

Regarding claim 26, Murphy further discloses that the device comprises an engine configured to generate torque; and said engine generates said exhaust (e.g. See col. 10, lines 12-67; col. 11, lines 1-15; col. 13, lines 22-42).

Regarding claim 27, Murphy further discloses that the engine comprises a diesel engine (e.g. See col. 10, lines 12-67; col. 11, lines 1-15; col. 13, lines 22-42).

Regarding claim 28, Murphy further discloses that the engine is configured such that said exhaust is characterized by an oxygen content of about 1 to about 20 percent, by weight (e.g. See col. 10, lines 12-67; col. 11, lines 1-15; col. 13, lines 22-42).

Regarding claim 29, Murphy further discloses that the device comprises an electrical generator driven by said engine; and said hydrogen generation section is powered by said electrical generator (e.g. See col. 11, lines 15-67; col. 12, lines 1-56).

Regarding claim 30, Murphy further discloses that the device comprises at least one exhaust treatment system in addition to said NOx treatment section (e.g. See col. 10, lines 12-67; col. 11, lines 1-15; col. 13, lines 22-42).

Regarding claim 31, Murphy further discloses that the NOx removal system comprises a controller programmed to control delivery of said exhaust to said NOx treatment section (e.g. See col. 10, lines 12-67; col. 11, lines 1-15; col. 13, lines 22-42).

Regarding claim 32, Murphy further discloses that the controller is programmed to: monitor a condition indicative of removal of said nitrogen oxides by at least one treatment zone of said NOx treatment section; and divert exhaust from said treatment zone when said treatment zone approaches its nitrogen oxide removal capacity (e.g. See col. 10, lines 12-67; col. 11, lines 1-15; col. 13, lines 22-42).

Regarding claim 33, Murphy further discloses that the controller is programmed to affect delivery of said hydrogen to said treatment zone following diversion of said exhaust from said treatment zone (e.g. See col. 10, lines 12-67; col. 11, lines 1-15; col. 13, lines 22-42).

Regarding claim 34, Murphy further discloses that the NOx removal system further comprises a controller programmed to control delivery of said hydrogen to said NOx treatment section (e.g. See col. 10, lines 12-67; col. 11, lines 1-15; col. 13, lines 22-42).

Regarding claim 35, Murphy further discloses that the NOx treatment section defines at least two independent NOx treatment zones; and said controller is programmed to deliver said

exhaust and said hydrogen respectively to different ones of said independent NOx treatment zones (e.g. See col. 10, lines 12-67; col. 11, lines 1-15; col. 13, lines 22-42).

Regarding claim 36, Murphy further discloses that the controller is configured to monitor accumulation and storage of hydrogen in said hydrogen generation section (e.g. See col. 11, lines 15-67; col. 12, lines 1-56).

Regarding claim 37, Murphy further discloses that the monitoring of said accumulation and storage of hydrogen is affected through a pressure monitor in communication with said controller (e.g. See col. 11, lines 15-67; col. 12, lines 1-56).

Regarding claim 38, Murphy further discloses that the device comprises: a vehicle body or stationary device; an engine configured to generate said exhaust and sufficient torque to accelerate said vehicle body or power said stationary device (e.g. See col. 10, lines 12-67; col. 11, lines 1-15; col. 13, lines 22-42).

Claim 49 is rejected under 35 U.S.C. 103(a) as being unpatentable over Murphy et al. (Murphy) (Patent Number 6,122,909) in view of Taylor, III et al. (Taylor) (Patent Number 6,843,054).

Regarding claim 49, Murphy discloses a device comprising an engine (15) and a NOx removal system (e.g. 30, 31, 189) for removing nitrogen oxides from an exhaust generated by said engine, said NOx removal system comprising a NOx treatment section (e.g. 30, 31, 189), a diverter (e.g. 48, 51), and a hydrogen generation section (e.g. 50), wherein: said exhaust comprises oxygen and nitrogen oxides; said NOx treatment section is configured to remove nitrogen oxides from said exhaust (Fig. 1-5); said diverter (e.g. 48, 51) is configured to enable

delivery of water to said hydrogen generation section; said hydrogen generation section is configured to deliver hydrogen to said NOx treatment section (e.g. See col. 11, lines 15-54); and said NOx removal system is configured such that said delivery of said hydrogen to said NOx treatment section is substantially isolated from delivery of a substantial amount of said oxygen in said exhaust to said NOx treatment section (e.g. See col. 10, lines 12-67; col. 11, lines 1-15; col. 13, lines 22-42). However, Murphy fails to disclose that the NOx removal system is configured to deliver said exhaust to one of said independent NOx treatment zones on a selective basis.

Taylor teaches that it is conventional in the art, to use the NOx removal system, which is configured to deliver said exhaust to one of said independent NOx treatment zones (e.g. 84, 86) on a selective basis (See Figs. 3-5; col. 7, lines 16-67; col. 8, lines 1-67).

It would have been obvious to one having ordinary skill in the art at the time the invention was made, to use the NOx removal system, which is configured to deliver said exhaust to one of said independent NOx treatment zones of Murphy, as taught by Taylor for the purpose of absorbing the NOx when the air-fuel ratio of the exhaust gas flowing into the absorbent is lean, and releasing the NOx when the air-fuel ratio of the exhaust gas flowing into the absorbent is rich; and supply additional reductant into the exhaust gas to change the air-fuel ratio of the exhaust gas flowing into the absorbent, so as to reduce the poisoned materials in the purifying catalyst and to reduce amount of nitrogen oxides in the exhaust gas of the lean-burn engine, and further improve the performance of the engine and the efficiency of the emission device.

Response to Arguments

Applicant's arguments filed March 09, 2007 have been fully considered but they are not completely persuasive. ***Claims 1-38, and 48-49 are pending.***

Applicant's arguments with respect to claims 1-38, and 48-49 have been considered but are moot in view of the new ground(s) of rejection as discussed above.

Applicant's amendment (Claims 1-38, and 48-49) necessitated the new ground(s) of rejection presented in this Office action. Accordingly, THIS ACTION IS MADE FINAL See MPEP. 706.07(a). Applicant is reminded of the extension of time policy as set forth in 37 CFR 1.136(a).

A shortened statutory period for response to this final action is set to expire THREE MONTHS from the date of this action. In the event a first response is filed within TWO MONTHS of the mailing date of this final action and the advisory action is not mailed until after the end of the THREE-MONTH shortened statutory period, then the shortened statutory period will expire on the date the advisory action is mailed, and any extension fee pursuant to 37 CFR 1.136(a) will be calculated from the mailing date of the advisory action. In no event will the statutory period for response expire later than SIX MONTHS from the date of this final action.

Conclusion

Any inquiry concerning this communication or earlier communications from the examiner should be directed to Examiner Binh Tran whose telephone number is (571) 272-4865. The examiner can normally be reached on Monday-Friday from 8:00 a.m. to 4:00 p.m.

If attempts to reach the examiner by telephone are unsuccessful, the examiner's supervisor, Thomas E. Denion, can be reach on (571) 272-4859. The fax phone numbers for the organization where this application or proceeding is assigned are (571) 273-8300 for regular communications and for After Final communications.

Information regarding the status of an application may be obtained from the Patent Application Information Retrieval (PAIR) system. Status information for published applications may be obtained from either Private PAIR or Public PAIR. Status information for unpublished applications is available through Private PAIR only. For more information about the PAIR system, see http://pair-direct.uspto.gov. Should you have questions on access to the Private PAIR system, contact the Electronic Business Center (EBC) at 866-217-9197 (toll-free).

BT
May 26, 2007

Binh Q. Tran
Patent Examiner
Art Unit 3748